



John F. Kennedy Space Center's Layered Composite Insulation



The National Aeronautics and Space Administration (NASA) seeks to license its Layered Composite Insulation (LCI) technology for use in commercial applications. Designed by the Cryogenics Test Laboratory at the John F. Kennedy Space Center (KSC) in Florida, this easy-to-use system can benefit industries that depend on regulation of low temperatures in equipment and products. The synergistic effect of improvements in materials, design, and manufacture of this new insulation technology exceeds current multilayered insulation (MLI) or foam insulation products. This new piping insulation can reduce costs and conserve product for companies that transfer fluids such as liquefied natural gas, refrigerants, chilled water, crude oil, or low-pressure steam, and companies that move refrigerated containers by land and sea and need to protect food, medicine, and other perishable commodities.

BENEFITS

- Performs up to six times as well as current MLI method
- Performs better at soft and high vacuum levels than world's best bulk insulator
- Protects against loss of product or overpressurization of tank in case of vacuum-jacket failure
- Reduces heat leakage because of innovative edge/joint feature
- Provides good radiation shielding and maximum suppression of gas conduction with compact spacing between layers
- Reduces evacuation and heating times compared to current MLI
- Reduces installation, maintenance, and life cycle costs (no high-vacuum requirements compared to current MLI and no environmental degradation or cracking compared to foam)

APPLICATIONS

- Insulate superconducting power transmission cables/equipment
- Insulate cryogen transfer piping
- Insulate distribution lines for medium- to high-temperature steam, gases, or liquids
- Store commodities such as liquid nitrogen, liquid argon, or liquid carbon dioxide
- Transport products at various temperatures
- Insulate space launch vehicle propellant tanks and feed lines
- Insulate storage vessels and thermal storage devices for industrial applications

TECHNOLOGY STATUS

- ☐ Patent pending
- ☒ U.S. patent
- ☐ Copyrighted
- ☒ Available to license
- ☐ Available for no-cost transfer
- ☐ Seeking industry partner for further codevelopment

Technology Details

The technology combines a unique layered cryogenic insulation system with specific manufacturing, packaging, wrapping, and rolling methods. One of the unique features of the LCI is its superior thermal performance: approximate R-values per inch for cryogenic conditions are R-1600 for high vacuum, R-90 for soft vacuum (about 1 torr), and R-10 for no vacuum. This new LCI system surpasses the current limitations of current MLI systems in:

- Performance in soft vacuum or degraded vacuum environments
- Sensitivity to mechanical compression
- Daily operational maintenance

The new LCI insulation can be continuously rolled or manufactured in blanket, sheet, or sleeve form. The LCI can also be used on aerospace cryogenic equipment, and terrestrial cryogenic tanks, pipes, and valves with multiple commercial applications.

Partnership Opportunities

NASA has acquired a U.S. patent for this technology and is seeking licensees of the patent. NASA has the authority to grant licenses on its domestic and foreign patents and patent applications pursuant to 35 U.S.C. 207-209. NASA has implemented this authority by means of the NASA Patent Licensing Regulations, 37 CFR § 404. All NASA licenses are individually negotiated with the prospective licensee, and each license contains terms concerning commercialization (practical application), license duration, royalties, and periodic reporting. NASA patent licenses may be exclusive, partially exclusive, or nonexclusive. If your company is interested in licensing the Layered Composite Insulation technology, or if you desire additional information, please reference Case Number KSC-12092 and contact:

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